

1. An actuation system for assisting the operation of the natural heart, the actuation system comprising:

a framework for interfacing with a natural heart;

an actuator system coupled to the framework and configured to engage an exterior surface of the heart, the actuator system comprising:

an actuator band extending along a portion of a heart wall exterior surface, the actuator band selectively movable between an actuated state and a relaxed state and operable, when in the actuated state, to assume a predetermined shape and thereby indent a portion of the heart wall to effect a reduction in the volume of the heart; and

a curvature limiting device coupled to the actuator band and operable for limiting the curvature that the actuator band imposes on the indented portion of the heart wall.

2. The activation system of claim 1, further comprising a drive apparatus coupled to the actuator band and operable for selectively moving the actuator band between the relaxed and actuated states to achieve the desired assistance of the natural heart.

3. The actuation system of claim 1, the actuator band configured to extend along a portion of the left ventricle heart wall, the band, in the actuated state indenting the wall and effecting a reduction of the volume of the left ventricle.

4. The actuation system of claim 1, wherein said actuator band includes a plurality of juxtaposed elements, the elements configured to be drawn together in the actuated state and to cooperate with each other, when drawn together, to assume the predetermined shape.

5. The actuation system of claim 4, wherein said elements are blocks coupled together by a cord, the cord operably coupled to be moved by the drive apparatus in the actuated state to draw the blocks together and form said predetermined shape.

6. The actuation system of claim 5, wherein said blocks have adjacent cooperating surfaces which are at least partially coextensive when the blocks are drawn together.

7. The actuation system of claim 1, wherein at least end of the actuator band is fixed to the external framework element.

8. The actuation system of claim 1 wherein said actuator band is coupled at an end to said external framework element.

9. The actuation system of claim 5 further comprising a plurality of cords coupling the blocks together.

10. The actuation system of claim 5 wherein the cord extends through one of an aperture and a channel formed in the blocks to coupled the blocks together.

11. The actuation system of claim 1 wherein the curvature limiting device includes a curvature limiting band coupled between the actuator band and the external framework element.

12. The actuation system of claim 1 further comprising a plurality of curvature limiting devices coupled to the actuator band.

13. The actuation system of claim 1 wherein said curvature limiting device is operable for limiting the curvature of the actuator band to a certain percentage of the natural curve of the portion of a heart wall exterior surface along which the actuator band extends.

14. The actuation system of claim 1 further comprising a plurality of actuator bands for indenting a portion of the heart wall

15. The actuation system of claim 1 wherein said actuator band comprises a plurality of articulated elements which move with respect to each other at joints.

16. The actuation system of claim 1 wherein the actuator band, in the relaxed state, is operable to generally assume the natural curve of the heart wall surface along which the actuator band extends.

17. An actuation system for assisting the operation of the natural heart, the actuation system comprising:

a framework for interfacing with a natural heart;

an actuator system coupled to the framework and configured to engage an exterior surface of the heart, the actuator system comprising:

an actuator band extending along a portion of a heart wall exterior surface, the actuator band selectively movable between an actuated state and a relaxed state and operable, when in the actuated state, to assume a predetermined shape and thereby indent a portion of the heart wall to effect a reduction in the volume of the heart; and

a paving element coupled between the actuator band and the heart wall for providing smooth functioning of the band with the heart wall.

18. The actuation system of claim 1 wherein the paving element is flexible.

19. The actuation system wherein the paving element includes a mesh.

20. The actuation system wherein the paving element includes a fabric.